

**REMARKS**

Claims 1, 5-8 and 10-15 are pending in the present application. Claim 1 is in independent form. Claims 1 and 10 are amended. Claim 9 is cancelled. In view of the above amendments and following remarks, favorable reconsideration and allowance of the present application is respectfully requested.

I. **CLAIM AMENDMENTS**

By the present Amendment, Applicants submit that claims 1 and 10 have been amended. Namely, the amendments to claim 1 are supported, at least, by claim 9 and paragraph [0028] of the originally-filed Specification. Claim 10 has been amended to clarify the relationship between the elements of claim 1 and the elements of claim 10. Thus, Applicants submit that the amendments do not introduce new matter.

II. **EXAMPLE EMBODIMENTS**

Example embodiments teach that the dimensions of electrodes define the thickness of the reaction layer in order to increase sensor performance. By doing so, the sensitivity of the DNA chip is increased compared to the sensitivity observed in the conventional art.

III. **CITED ART GROUNDS OF REJECTION**

(A) *Claims 1, 5, 6 and 8-15 stand rejected under 35 U.S.C. §103(a) as allegedly being anticipated by Albers et al. (hereinafter “Albers”), WO*

*00/62048 to in view of Johnson et al. (hereinafter “Johnson”), U.S. Patent No. 6,372,813 B1. Applicants respectfully traverse the rejection.*

i. INDEPENDENT CLAIM 1

Amended independent claim 1 is directed to a DNA chip including (*inter alia*) “the hydrophilic reaction layer having a thickness between 2 $\mu$ m and 10 $\mu$ m” and “the hydrophilic reaction layer being a hydrogel, the hydrogel including a cross-linking agent.” Applicants submit that the combination of Albers and Johnson fails to explicitly teach, or otherwise suggest, the above features recited in amended independent claim 1.

a. THE COMBINATION OF ALBERS AND JOHNSON

The rejection states that Albers is “...silent about the reaction layer thickness range of 2  $\mu$ m to 10  $\mu$ m.” Action, p. 5. Thus, the Examiner states “Johnson et al teaches a biochip comprising a polymer hydrogel arrays, wherein thickness of the hydrogel layer (i.e., reaction layer) is between about 1  $\mu$ m and about 40  $\mu$ m or preferably between about 3 and 30  $\mu$ m and optimally about 5  $\mu$ m (column 5, lines 31-37). The thickness of hydrogel layer (i.e., reaction layer) of 5  $\mu$ m is encompassed by the thickness between 2  $\mu$ m to 10  $\mu$ m or thickness of approximately 3 or 7  $\mu$ m as claimed.” Action, p. 9.

Although Johnson teaches hydrogel microlocations each having a thickness of about 5- $\mu$ m, Johnson fails to teach, or suggest, any electrode array. Applicants submit that there are a host of devices including a

reaction layer that vary in thickness to other devices. Because Johnson and Albers teach different values for the electrode size and form, the combination of Johnson and Albers would produce a variety of different chip arrangements. Furthermore, a chip without electrodes as taught by Johnson offers no suggestion about the thickness (of a reaction layer), which depends on the electrode size and spacing, needed to increase the sensitivity of a sensor.

Thus, Applicants submit that there is no motivation to use the reaction layer of Johnson in the electrode arrangement of Albers, absent inappropriate hindsight of the Applicant's disclosure regarding the correlation between the electrode width and/or spacing to the reaction layer thickness.

Also, Johnson teaches that "...the present invention provides a means of attaching a biomolecule to a polymer hydrogel/hydrogel array with use of a 2+2 photocycloaddition reaction." Johnson, col. 16, ll. 52-54. In particular, Johnson teaches that "...the gel is formed by exposure of the prepolymer to light (e.g., ultraviolet (UV) light) in the presence of a sensitizer to generate a 2+2 photocycloaddition reaction." Johnson, col. 16, l. 66 - col. 17, l. 3. Thus, Johnson teaches a photoreaction (*i.e.*, UV light) is used to crosslink the gel, not a "cross-linking agent" as recited in amended claim 1.

For at least these reasons, Applicants submit that Albers in view of Johnson fails to explicitly teach, or otherwise suggest, a DNA chip including "the hydrophilic reaction layer having a thickness between 2 $\mu$ m and 10 $\mu$ m"

and "the hydrophilic reaction layer being a hydrogel, the hydrogel including a cross-linking agent" as recited in amended independent claim 1.

Accordingly, Applicants respectfully request that the Examiner reconsider and withdraw the rejection to independent claim 1, and claims 5, 6, 9 and 10-15 at least by virtue of their dependency on independent claim 1.

(B) *Claims 1 and 7 stand rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Albers in view of Johnson and further in view of Valint, Jr. et al. (hereinafter "Valint"), U.S. Publication No. 2002/0102415 A1. Applicants respectfully traverse the rejection.*

Applicants note that the rejection states that claims 1 and 7 are rejected in view of Albers, Johnson and Valint. However, the comments are directed to the subject matter in claim 7. Thus, Applicants assume that claim 7 is rejected in view of Albers, Johnson and Valint and claim 1 is rejected in view of Albers and Johnson (i.e., not Valint). If it appears that Applicants have misunderstood the rejection, Applicants respectfully request that the Examiner clarify the rejection in the next Patent Office communication.

i. CLAIM 7

Claim 7 is directed to the DNA chip of claim 1 wherein "the reaction layer is thermally stable up to approximately 95°C." Applicants submit that

the combination of Albers, Johnson and Valint fails to explicitly teach, or otherwise suggest, the above features recited in amended claim 7.

a. THE COMBINATION OF ALBERS, JOHNSON AND VALINT

Initially, Applicants submit that Valint fails to teach, or suggest, "the hydrophilic reaction layer having a thickness between 2 $\mu$ m and 10 $\mu$ m" as recited in claim 1. Thus, Valint fails to remedy all of the deficiencies of Johnson with respect to independent claim 1. As such, claim 7, at least by virtue of its dependency on independent claim 1, is patentable over the combination of Albers, Johnson and Valint.

Furthermore, acknowledging the deficiencies of Albers and Johnson with regard to thermal stability, the rejection states that "Valint et al teaches a hydrogel polymer that it resistant to heat up to 90C, i.e., approximately 95C (paragraph 0217). Valint et al further teaches that hydrogel having thermal stability is sterilized easily using conventional autoclave without changes in its property (paragraph 0152, Table 13)." Action, p. 10.

However, Valint, directed to the surface treatment of silicon hydrogel contact lenses, fails to teach, or suggest, anything about a DNA chip or the thermal stability of a reaction layer.

Also, paragraph [0152] of Valint merely teaches that the lens dimensions of the sterilized lens are checked after autoclaving. Paragraph [0217] of Valint shows the XPS data wherein there is a decrease in the carbon (C) content in a coating layer, an increase in the oxygen (O) content and changes in the silicon (Si) and the nitrogen (N) content after plasma

treatment. The teachings in paragraph [0152], along with the data in Table 13 of paragraph [0217] of Valint, teach nothing about the structure and the bioactivity of a gel layer.

Further, plasma treatments change surfaces, and are used to disinfect surfaces. Thus, because Valint relates to the use of plasma treatments, one of ordinary skill in the art would not look to Valint to teach the deficiencies of Albers and Johnson.

For at least these reasons, Applicants also submit that Albers in view of Johnson and Valint fails to explicitly teach, or otherwise suggest, "the reaction layer is thermally stable up to approximately 95°C" as recited in claim 7.

As such, claim 7 is patentable over the combination of Albers, Johnson and Valint for its own merits, as well as by virtue of its dependency on independent claim 1.

#### IV. PROVISIONAL DOUBLE PATENTING REJECTIONS

(A) *Claims 1 and 5-15 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 1-18 of co-pending U.S. Application No. 10/539,817 in view of Johnson and Valint.*

Applicants maintain that the rejection is held in abeyance until either U.S. Application No. 10/539,817 or the present application issues into a patent (as acknowledged by the provisional status of the rejection).

(B) *Claims 1 and 5-15 stand provisionally rejected on the ground of nonstatutory obviousness-type double patenting as allegedly being unpatentable over claims 11-15 and 19 of co-pending U.S. Application No. 10/539,437 in view of Albers and Johnson and further in view of Valint.*

Applicants maintain that the rejection is held in abeyance until either U.S. Application No. 10/539,437 or the present application issues into a patent (as acknowledged by the provisional status of the rejection).

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**CONCLUSION**

Accordingly, in view of the above, reconsideration of the rejections and allowance of each of claims 1, 5-8 and 10-15 in connection with the present application is earnestly solicited.

Should there be any matters that need to be resolved in the present application; the Examiner is respectfully requested to contact the undersigned at the telephone number below.

If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 08-0750 for any additional fees required under 37 C.F.R. § 1.16 or under 37 C.F.R. § 1.17; particularly, extension of time fees.

Respectfully submitted,

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